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**FACSIMILE TRANSMISSION COVER SHEET**

DATE: November 4, 2003

TO: Examiner Taylor V. OH  
U.S. Patent and Trademark Office

Re: U.S. Patent Appln. S.N.: 10/019,287  
Group Art Unit: 1625  
Our Reference: P0102-0738-011731

FROM: James E. Armstrong IV

FAC. TEL. NO.: 703-308-4556

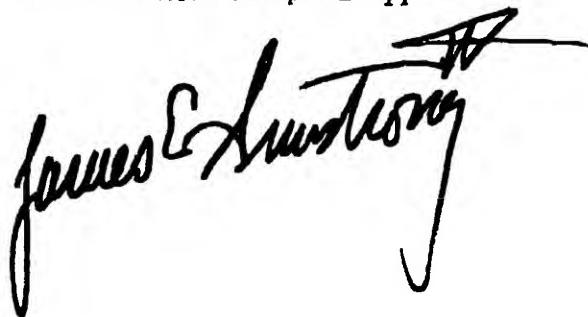
NUMBER OF PAGES (INCLUDING THIS COVER SHEET): 5

**PLEASE ACKNOWLEDGE SAFE AND CLEAR RECEIPT OF ALL PAGES BEING SENT**

Dear Examiner Taylor V. OH

Further to my telephone message, please find attached a copy of a Response to the Restriction Requirement filed on October 24, 2003 along with a copy of a reference, namely, Takahashi H., Proceedings of the International Tribology Conference, Yokohama 1995, p.875, *New Evaluation Method for the Lubricity of Refrigerating Oil* for the above-identified U.S. patent application Serial No. 10/019,287.

With best regards,



James E. Armstrong IV

JAM/x1

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **KAWAHARA, Yasuyuki et al.**

Group Art Unit: 1764

Serial No.: 10/019,287

Examiner: Taylor V. OH

Filed: January 2, 2002

P.T.O. Confirmation No.: 1458

For: **DICARBOXYLIC DIESTER, PROCESS FOR PRODUCING THE SAME, AND  
REFRIGERATING MACHINE LUBRICATING OIL COMPRISING THE ESTER**

**RESPONSE TO THE RESTRICTION REQUIREMENT**  
**DATED September 24, 2003**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**COPY**

Date: October 24, 2003

Sir:

This paper is submitted in response to the Official Action dated September 24, 2003.

In the Action, restriction is required between Group (I), Claims 1-5, 14-16, and 18; and Group (II), Claims 12-13 and 31-33; and Group (III), Claims 6-11 and 19-30.

Applicants hereby elect the subject matter of Group (III), Claims 6-11 and 19-30 for prosecution in this application. This election is made with traverse, for the following reasons:

1. Unity of invention was recognized in the IPE report, therefore PCT Rule 13.1 was met.
2. Technically, the process (Group III claims) inherently results in the claimed ester compounds (Group I claims) which are now the state of the art in refrigerating oils (Group II claims), because old refrigerating oils containing CFC's have been banned (see enclosed article). The special technical feature is of course the ester compounds of the generic formula

(E) recited generally and specifically in all groups of claims.

3. Because all groups should be examined together and undue diverse searching (only searching for formula (E)) should not be required, it is requested that the election requirement be withdrawn.

The process of Group III inherently results in the compounds of Group I because the process of Group III is limited by formulas (1-3) in independent claim 6 and formulas (4, 4a, 5, 5s, 7 and 8) in independent claim 19. These are the same formulas of the Group I compounds recited in independent claims 1-3 and 14. The special technical feature is of course the ester compounds described by the chemical formulas.

Furthermore, the enclosed article states the current art of refrigerant oils are HFC refrigerant oils because CFC oils have been banned because they are harmful to the environment. In addition the specification on p.2-4 describes that oxygen-containing synthetic oils, such as polyol esters and polyalkylene glycols have come to be used for refrigerator oils.

The result is a complete shift in refrigerator oil technology, making the ester compounds of Group I, one and the same with refrigerator oils (Group II ) that contain the compounds. The realization of the harmfulness of CFC's and HCFC's caused this complete shift in technology as explained on p.875 of the attached article.

U.S. Patent Application No. 10/019,287  
Reply to Restriction Requirement of September 24, 2003

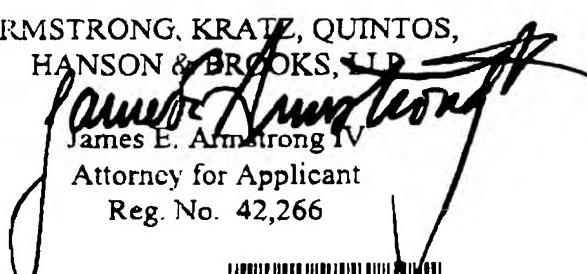
Because the applicants have proven unity of invention consistent with the IPE report recognition of unity of invention, the applicants respectfully request that all claims 1-33 be examined in the same application.

In the event that this paper is not timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 01-2340.

In the event any additional fees are required in connection with this response, please charge our Deposit Account No. 01-2340.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

*Proceedings of the International Tribology Conference,  
Yokohama 1995.*

## NEW EVALUATION METHOD FOR THE LUBRICITY OF REFRIGERATING OIL

Hitoshi TAKAHASHI

Japan Energy Corporation, Toda, Saitama, Japan

A new test method to evaluate refrigeration oil's lubricity was introduced. The key point of new method is solvent dilution of oil to simulate actual condition of compressor. The evaluation results correspond well to the compressor test's results. Furthermore, a new anti-wear agent which has superior lubricity improvement was found. The introduced new method is very helpful on selection of effective base oils and additives.

Keywords : Lubricity, HFC, Ester, PAG, Falex

### 1. INTRODUCTION

As a countermeasure for destruction of stratospheric ozone layer, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) which had used as refrigerant for every kinds of refrigerating systems have been switched to chlorine-free hydrofluorocarbons (HFCs). CFCs are going to be banned producing and using at the end of 1995, and HCFC regulation will start soon. These regulation have forced to switch refrigeration oil. Because conventional refrigeration oils, such as mineral oil and alkylbenzene, are not soluble with HFCs. Fortunately, some synthetic oil, i.e. polyolester (POE), polyalkyleneglycol (PAG) and so on, have been found as refrigeration oil for HFC refrigerant.

However, some difficulties are still existing in new refrigerating systems applying HFC and new oil. Lubrication is one of the insufficient property. In case of old system, chlorine in refrigerant molecule works as extreme pressure agent composing Cl-

metal compound on the surface of sliding parts. While HFCs have no chlorine in their molecule, thus refrigerant works as oil diluting solvent, not to work as EP agent. Though synthetic oils for HFC refrigerant have good lubricity comparing with conventional refrigeration oil, lubrication of new refrigerating system should be severe. Thus, new refrigeration oil are desired to have more superior lubricity.

### 2. NECESSITY OF NEW METHOD

However there are various methods to evaluate oil lubricity, the results of such laboratory tests often do not correspond to the results of actual compressor tests. Those have been well known since new refrigeration system started to be developed. These unsatisfactory correlation between laboratory test results and practical refrigerating system performance seem to come from disregarding oil dilution by refrigerant. Generally, laboratory test